



DUPLICATING TECHNOLOGIES, INC.

PLEASE READ THE FOLLOWING INFORMATION CONTAINED ON THIS PAGE

IMPORTANT!! IMPORTANT!!

Do not be alarmed at all the following paperwork concerning our Density Doubler. Some of it may not apply to your drive. There are a few important facts that we would like you to be aware of.

Please take the time to review the following pages. We have explained all facets of our Density Doubler in a very explicit and easy to understand format. Take the time to read this information. Thank you.

ABOUT THE DENSITY DOUBLER

We would like to take this opportunity to thank you for purchasing our product. The Density Doubler uses the latest high tech solid state components and should provide a lifetime of trouble free operation.

The Density Doubler is really a small computer using the same 6502 microprocessor that Atari uses in all of its computers. The Density Doubler has a ROM operating system and 4K of RAM memory.

After you have installed the Density Doubler, boot a DOS disk and immediately you will notice that the disk drive will load and read data faster than before. Originally your drive read one sector at a time. This was caused by a small sector buffer of only 128 bytes. You have now replaced this 128 byte buffer with our 4000 byte buffer. Instead of reading one sector at a time, we read one track of eighteen sectors at a time. From this scheme disk read time is dramatically reduced and wear and tear on your drive will also be greatly reduced.

HIGH SPEED READ Problems and Considerations

We have told you about all the advantages of fast reading or what we call whole track buffering. There is only one disadvantage to this fast read. That is, some heavily copy guarded disks will not load or boot in this fast mode. Some software manufacturers waste thousands of dollars and hours placing foolish custom formats on a disk just to prevent you from making a backup copy. This form of protection depends on disk timing routines. In other words, the protection scheme will take longer to boot than a regular disk, so if their protected disk booted faster than the time expected, they would assume it to be a pirated copy and the program would not run.



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Problem number two; software manufacturers will try to detect the presence of any modification to the disk drive. They will even try to mess with the programmability of your Density Doubler. This we feel is a silly waste of their time.

SOLUTION

You can lock the Density Doubler and make it invisible to these attempts of sabotage just by running a simple program we provide. You can now deprogram your drive. The Density Doubler will be inactive (your drive will be stock.) It will now boot in its old slow mode and remain this way until you turn off power to the drive. Just turn it back on and the Density Doubler will be back. We like to call this fast and slow mode. This can be toggled back and forth by software. (The default mode of the drive will always be density doubler activated when you power up the drive.)

If you ever find a piece of software that will not boot just force a slow mode or remove the Density Doubler by software, then the disk will boot. We have never found a piece of software that would not boot in a Density Doubler drive.

THINGS TO REMEMBER

1. If a disk won't boot, then run the program to remove the density doubler (slow mode.)
2. A smart drive can sometimes be fooled. The buffer can fill with garbage bytes. If your drive acts strangely turn it off, then on. This will clear up the problem.
3. Do not use DOS 3 from Atari. It has bugs and is not true double density.
4. Use Sparta DOS. This fine product will make the Density Doubler automatically kick into ultra speed read and write. These high speed capabilities are supported in the density doubler ROM.

INSTALLING THE DENSITY DOUBLER

You will be installing the density doubler in your 1050 or 810 drive. Even though this will be a simple plug in installation, certain precautions should be taken.

- A. Computer IC chips could be destroyed by any static charge. Avoid working on a rug or wearing any wool clothing.
- B. The legs on IC chips will not tolerate too much bending or abuse. They are very delicate.



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- C. When you unplug a connector do not pull it out by its wires. They can break off from the pulling. Grasp the plastic body of the connector with your fingers or better yet, a pair of long nose pliers. If a tightly seated connector seems like it won't come out, a slight bit of wiggling back and forth will persuade it to come loose.
- D. Do not use any magnetic tool to work on a disk drive. The read/write head could be damaged by a magnetized screwdriver.

GETTING STARTED

Tools you will need:

A Philips head screwdriver. Also, you will have to remove two IC chips. For this you can use a very small flat bladed screwdriver, a metal fingernail file, or an exacto knife. Better still, an IC puller, such as those sold by Radio Shack, but this is not mandatory. A pair of needlenose pliers will be helpful in removing the connectors as explained in this scope.

HOW TO REMOVE AN IC

When you remove an IC chip use caution. If you bend the pins it will be hard to plug it back into its socket. But if you do, you can straighten them out with a small pair of pliers.

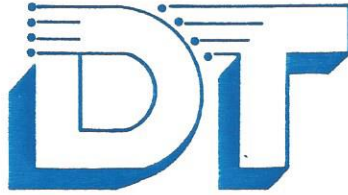
To remove the IC you will insert the thin blade of a flat screwdriver or exacto knife under the chip body and gently pry it up slowly lifting the IC from its socket. As you pry and lift the tool can be slid farther under the IC body. Lift the IC up and out slowly.

Take your time. When you have the IC halfway out, go to the other side and lift up, working the IC slowly out of its dip socket. Do not bend any of the pins or legs on the IC body. Try not to force the IC out from its socket. Gentle persuasion will work every time, not brute force. Remember the IC's you remove are designed to be inserted and removed from the dip sockets on printed circuit boards.

INSTALLING THE DENSITY DOUBLER

You will now begin the installation.

Step 1) Take your drive and turn it upside down and locate the six philips head screws, (four on the drive base and two on the brown or black lip of the drive). Now remove all six screws. You might have to shake and twist the drive a little to get all six screws out. If they don't all come out, don't worry. They will come out when we do our next step. We suggest you keep all the screws and parts you remove in some kind of container.



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Step 2) Now open the drive up. Lift the top up and work it forward. You might have to twist and wiggle the top cover to separate the two halves of the drive. The black drive cover front plate might separate from the top cover, don't worry, it will go back in place later when you assemble the drive.

Step 3) The drive cover can now be placed aside exposing the entire drive. You will now have to unplug seven connectors in order to disassemble the drive. Use caution when you remove the connectors. Do not pull them out by their wires. Use a pair of long nose pliers or your fingers on the plastic base of the connectors. You might have to wiggle them from side to side to loosen the connectors. Whatever you do, don't pull hard on the wires because to do so might just break a wire off. Refer to your drawing of the 1050 drive as to how to locate connectors and ICs. Now locate the five brown connectors. Look to the rear and to the left. They have lots of white wires on them and are in a row from front to back J11, J12, J1, J10, and J14. You might want to make a sketch on paper so you will be able to replace them in their proper order. If you get them mixed up, the proper replacement is marked on the drive PC board. Now remove J11, J12, J1, J10, and J14.

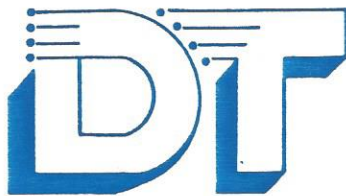
Step 4) Now locate and remove the brown plastic connectors J15. It will be on the right side of the drive and towards the back. The wires will be colored red, black, red, orange, brown, and yellow.

(Note: all connectors have polarity which means they could be plugged in either way, but one way only, will be electrically correct. Be sure to observe this color coding or marking as to the right way to install the connectors when you plug them back in after installing the density doubler.) After removing J15 go on to step 5.

Step 5) We now have one more connector to remove. This connector has a black wire going to it. This J6 connector is located under the drive mechanism. Gently lift the whole assembly straight up. It rests on four metal dowel pins. This makes removal and replacement a simple operation. Treat this assembly with caution as not to shake or drop it. While holding up the drive assembly with one hand, use your other hand to unplug and remove J6 (a black plastic connector, located to the right and towards the front of the drive.) Its red wire will face forward.

xxxCautionxxx

This J6 connector has very delicate fine wires feeding into it. Take care not to break any of them. You will now be able to remove and lay the whole drive assembly aside.



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Step 6) Remove the whole PC board from the bottom of the drive. First you must locate two small plastic lock tabs on each side of the drive case. They are towards the front. Bend them outward and lift the bottom PC board out.

Step 7) You will now have to remove the metal RF shield from the main PC board. This will be an all metal square can with several holes in it like a piece of swiss cheese. On the bottom under the PC board you will see the other half of this tin can like cover. You will see four small metal tabs. Bend and twist them with a pair of needle nose pliers, so you can separate the two halves of the RF shield. Now remove the shield and place it aside.

Step 8) You will now have to remove two IC chips, the Atari eprom, and the 6507 microprocessor. They are marked on the PC Board U10 and U9. Refer to our diagram and our instructions on how to remove ICs. It is easy to spot U10, it will have a white label on it and might say (copyright 1983 Rev K Tandon corporation.) Directly to the right of this chip will be IC U9. Remove U10 and U9 now. (Note: Atari has changed the type of floppy disk controllers used in their 1050 drives from time to time. The density doubler will work in any 1050 regardless of the type of floppy disk chip.) Other hardware products will not work with all different controllers. There might come a time in the future when we will upgrade your software. The information as to what chip you have in your drive would be useful to us. Please take a minute and write down the number of the chip in your drive. The chip will be a long large 40 pin package to the left of U10. It will be marked U13. There is a 90% chance that your chip will be marked 2793. It could be marked 2795 or 2797 or something else. There will be other numbers on it. They are not important. The type of chip you have could be useful information to us and to you as well. Thank you for noting this information for us. Now finally, The Density Doubler.

Step 9) Plugging in the Density Doubler. On the bottom of the density doubler you will see a 28 pin gold male connector (yes, real gold--very expensive, and only the best for our customers.)

xxxCautionxxx

This connector is very delicate. Use care when you plug the density doubler in. The pins on this connector will break off very easily and will not tolerate much bending. If you should bend a pin, you will be able to straighten it only once. The second time you bend it there is a good chance it will break. A broken pin could be costly for us and time consuming for you. Please be careful when you plug in the density doubler. The gold connector will plug into IC socket U9 which should now be empty. You can only plug the Density Doubler in one way; the right way. If you try to insert the board the wrong way it will bottom out on top of Y1 (a can crystal) and not seat all the way in.



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Step 10) Installing and seating the Density Doubler. Now plug in the Density Doubler by laying it over U9. It is important that all the pins in the gold socket line up with all the female holes in U9. Try to look under the Density Doubler board and make sure they are lined up before you push down and seat the Density Doubler. If the Density Doubler is lined up correctly, it should just touch or be very close to Y1 (the small can crystal). In other words, the PC board will just make it being a very close fit. Push down on the Density Doubler board firmly but do not force it. This will seat it. The Density Doubler should be plugged in as far as it can go for proper operation.

xxxImportantxxx

The Density Doubler board is 100% tested and burned in before shipping. If your board doesn't work it is more than likely you haven't plugged it in properly. This is very critical and important. It is easy to plug a Density Doubler in one pin off. If there is any significant space between the edge of the Density Doubler and the can crystal, then you might have the whole board in but one pin off. This will be hard to see. Vision is limited under the Density Doubler once it is installed.

Step 11) Putting the drive back together. You will now put the drive back together. This naturally is the reverse of taking it apart. However, there are a few things to remember. Make sure that all connectors are oriented and plugged in the right place as to polarity and by J number. There are four black rubber washers that go on each metal dowel pin, under the drive mechanism. These could have fallen off. Remember to have them in place. If you have trouble installing the RF shield can or if the tabs break off you don't need this can. It will not affect the operation or performance of the drive in any way.

We suggest you partially reassemble the drive, then test it to be sure all is well. The IC chips you have left out of the drive will not be needed. Their function is replaced by the powerful IC circuitry of the Density Doubler board.

TROUBLE SHOOTING SECTION

If the Density Doubler does not work, we have found these to be the most common mistakes made. 95% of all failures are due to improper INSTALLATION.

Here are the mistakes made:

1. Connectors not plugged in all the way.
2. Connectors not plugged in at all.
3. Connectors plugged in backwards.



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4. Connectors plugged in wrong color coding.
5. Connectors plugged in the wrong plug, i.e J10 where J11 should be.
6. Connectors plugged in 1 pin off.
7. Failure to remove IC U10 from the Eprom.
8. Forgetting to plug in J6 or J6 is backwards.
9. Density Doubler board not seated all the way down.
10. Density Doubler board pins out of alignment with U9.
11. Density Doubler plugged in wrong socket U10.

Any one of the above mistakes could cause a non fatal malfunction of the drive or Density Doubler board. If all of the above are correct and the drive will not work then call us at once for help.

DENSITY DOUBLER SUPPORT SYSTEM

SIDE 2 OF THE COPY DISK

You will find a user friendly true Double Density Dos of Side 2 of this disk. You may use this Dos or any Double Density Dos to convert your files or program to double density.

You will not be able to convert a copy guarded disk into double density. Follow our formatting instructions very closely. If you use this Dos formatting it is very simple but can be tricky. Your drive can easily be fooled as to what density it will format in. To call out our Dos just boot Side 2 with BASIC removed.

RPM Test Program

This file will be binary loaded using the 'L' option of Dos. Just type 'L' then the file name and hit RETURN. Check your drive speed it should be 288±1.

Force Drive Density

This will force the drive into single density and stay there until turned off and on again. If you have to format a Double Density disk with old Atari Dos 2.0s then you will have to use this option. This is one way of solving the problem that Dos 2.0s can't format a Double Density disk in single density. We have covered this Dos bug elsewhere in our instructions.

Our disk utilities programs were written ACTION. This powerful Atari programming language is very easy to use. If you have any suggestions as to more programs we can write for the Density Doubler please feel free to write us. Any suggestions will be appreciated.



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Formatting Disks

To format a disk in Double Density with the Dos we provide:

- a) Boot the Dos
- b) Remove the Dos master disk
- c) Insert the disk to format
- d) Use 'P' to set density
- e) Then use 'I' to format the disk

Using Atari Dos 2.5

If you find you can't format a disk in Single Density with Atari Dos 2.5 the error 139 returned will mean the disk you are trying to format is Double Density. To fix this problem first use the 'I' option and format the disk in density and half then use the 'P' option and reformat the disk in single density this will fix this problem.

Using Atari Dos 2.0s

Once a disk has been formatted in density and half or Double Density you will not be able to reformat that disk with Dos 2.0s we suggest you always use the new Dos 2.5. This Dos can better handle the newer Double Density disks.

PROBLEMS AND CONSIDERATIONS OF COPYGUARDED SOFTWARE

The problem with some heavily copyguarded disks is they will not boot or do not like booting on a density doubler enhanced drive or any Double Density drive. E.g Rana, Indus and Percom drives. It is not uncommon to find some copyguarded disks not booting on any double density drive at all.

The reason for this is: All Double Density drives must have a way of automatically determining what density disk is placed in it when the door is opened. A disk is inserted and the door is closed. What density the drive should change to is determined by reading track 0 of the disk. Every time a disk is placed in the drive after a quick read of track 0 the drive will determine if the disk is single or double then proceed to boot the disk. This density sensing scheme works very well and is the only solution for how a drive determines what density it should be in at boot up time.

The problem is some software manufacturers place their copyguards on track 0. Custom formats consisting of 19 sectors or 2 or 3 CRC error sectors on track 0 will confuse the drive as to what density it is supposed to be in. Your drive may find itself in a hopelessly confused state and a boot error will occur.



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The solution to this problem is easy for the Density Doubler. From software we can disable the Density Sensing Mechanism. Theoretically a Double Density disk will never be copyguarded so you don't need density sensing when booting commercial copyguarded software.

If you invoke a force slow from software this will solve the problem we have never found a copyguarded disk that will not boot in the force, slow mode.

XE COMPUTERS

IMPORTANT NOTE

Some Atari XE Computers will cause our high speed Ultra Read and Write Software to run slower than normal. If you experience this problem the fault will be a bug in your XE computer not in the Density Doubler or the drive.

There is a simple fix for this problem. Just open your XE computer locate the second black IO cord connector. It will be the one right or closest to the outside of your computer. You will see 1 glass diode going to each pin of the IO connector. These glass diodes were used in some computers and not others. They are not needed and the only purpose they serve is to slow down the baud rate of data transferred between computer and drive. The Density Doubler operates at such a high rate of speed that these diodes will slow it down. Just cut out these diodes, they serve no purpose and this will cure any problems they might cause.

